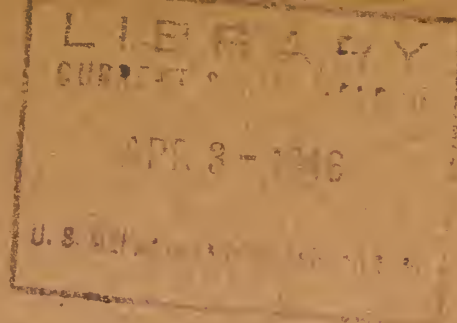


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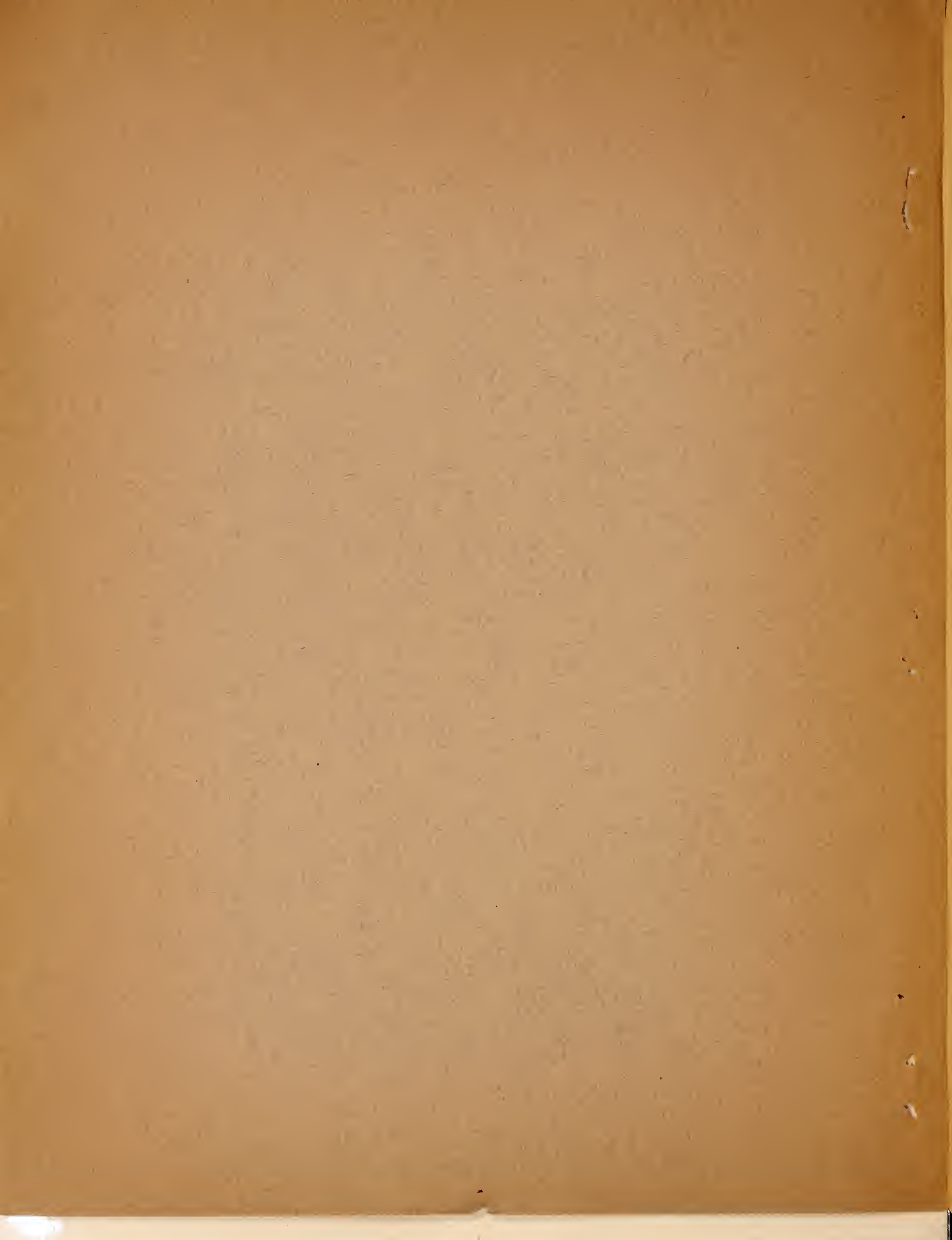
NEVADA COOPERATIVE SNOW SURVEYS

Seasonal Snow Survey and Kindred Data
with Forecast of Streamflow in Nevada
March 1, 1946

Part I. Eastern Sierra Nevada
By Nevada Forecast Committee:
H. P. Boardman, George Devore
Leigh Sanford

Part II. Humboldt River Basins
Eastern and Southern Nevada
and Nevada National Wildlife
Refuges
By J. E. Church, H. P. Boardman
and Clyde E. Houston

Nevada Agricultural Experiment Station
Reno, Nevada



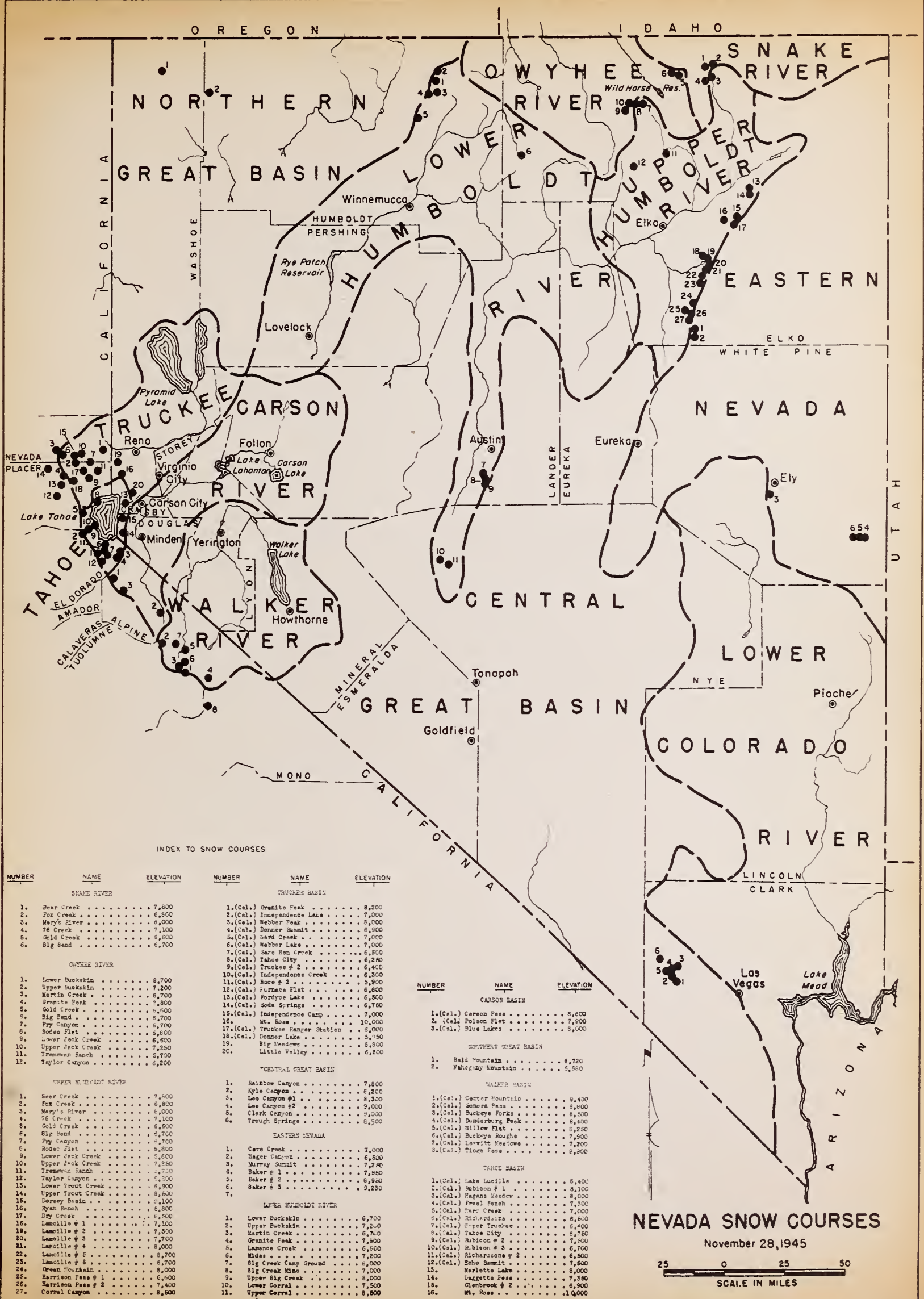


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Journal of Management Studies, 19(1), 67-80.

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Journal of Management Education 30(6)p. 789-804

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PROGRESS AND NEEDS

1. Stream Gages

The plan of measuring the runoff of all the principal tributaries of the Humboldt has now been accomplished by gages along the main stream or at the outlet of the feeders. The cross-sectional measurement has been planned for all water centers along the river. Stations for the Lamoille and Bishop-Trout Creek areas are still lacking.

The long planned and essential gage at the canyon throat of Marys River will be definitely established this year. The counter-effect of heavy initial water supply and impeded flow should be studied with a view to increasing the net water supply of the Humboldt.

2. Well Measurements

The well measurements in the Humboldt and Lamoille Valleys have now proved so essential in the study of ground water and forecasting of streamflow that all accumulated data are now being tabulated and summarized by the U. S. Geological Survey.

3. Snow Courses

By the cooperation of the U. S. Soil Conservation Service the snow courses in the Humboldt Basin have been improved and the normals revised.

New courses have been laid out at 76 Creek to avoid the danger of entering the upper Marys Basin and in Pahrump Valley to extend the system of snow surveys on Mount Charleston. A snow course should be laid out in Pole Creek in Northeastern Nevada to serve the Salmon Falls Basin and averaged with the course at 76 Creek as a bridge for estimating the snow cover of Marys River. A course has been selected at Virginia Lake in the East Walker Basin as substitute for the windswept course on Dunderberg Peak.

The map of Nevada Snow Survey Courses forming the frontispiece has been revised and expanded by Clyde E. Houston, representative of the Soil Conservation Service for snow surveys in Nevada and Arizona.

The first thing I noticed when I stepped out of the plane was the cold. It was a sharp contrast to the warm, humid air of the tropics. The ground beneath my feet was a mix of dirt and gravel, and the air smelled of dust and exhaust. I looked around, trying to get my bearings. The landscape was flat and desolate, with a few small, scattered trees in the distance. The sky was a pale, hazy blue, and the sun was low on the horizon, casting a long, soft glow over the scene.

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4. Precipitation Stations

The U. S. Weather Bureau is cooperating generously in providing seasonal and recording precipitation gages to supplement the snow surveys and provide records of precipitation during the period of runoff. Recording gages will be of special value above the snow line and at the sources of precipitation-supply, where observers are rarely found.

5. Safety

Shelter cabins are being constructed or planned for Baker Creek and Mount Charleston through cooperation of the Soil Conservation and Forest Services for the former and State and Nevada Colorado River Commission for the latter. A shelter will soon be constructed on Trout Creek.

A Tucker Sno-Cat has been purchased by the Soil Conservation Service and was used in the March 1 snow surveys in the Humboldt Basin and for caching supplies in the Eastern Sierra. A similar motor sled has been provided by the Southern California Edison Company for use at Huntington Lake. A light army M-7 is used very successfully by the Central Sierra Snow Laboratory for traversing the peaks near Donner Summit.

Helicopter planes are being tested by the Forest Service in forest management. If they can land and take off in the summer, they will also be tested in winter.

6. Personnel

Clyde E. Houston, though the direct representative of the Soil Conservation Service for Nevada and Arizona, is cooperating intimately with the Nevada Agricultural Experiment Station and sharing in its snow studies. He will carry much of the work of Carl Elges who is still in Service.

7. Reorganization

The Nevada Cooperative Snow Surveys originated in 1919 by recommendation of Governor Emmet D. Boyle and appropriation by the Legislature to the State Engineers, who have been deeply interested in the growth of snow-surveying throughout the years.

The work has been guided by the Forecast Committee consisting of H. P. Boardman, George Devore, and Leigh Sanford but the problems of the Humboldt have been retained by the staff of the Agricultural Experiment Station. Cooperation has expanded. But the State Engineer now feels that a more representative and formal organization should be perfected and larger funds solicited from public and state sources. The alert interest in all information regarding water resources justifies this plan.

PART I. EASTERN SIERRA BASINS

PRE-SURVEYS AND FORECASTS

AT KEY STATIONS

In contrast to the other basins of Nevada, the annual snow-survey and forecast of the Eastern Sierra Basins is postponed until April 1 when the major seasonal flow begins.

To keep in close touch with the progress of snow accumulation, however, monthly surveys are conducted at key stations throughout the winter, and have been tabulated in the following report.

As will be seen, the Yuba, Truckee and Tahoe Basins have between 80 and 87 percent of the April 1 normal but the Carson Basin only 63 percent. Mono Basin at Tioga Pass, however, has 75 percent, indicating that the Walker Basin situated between these two may have a snow cover of approximately 70 percent. In these basins the runoff should correspond closely with the snow cover.

The storage March 1 is ample. Lake Tahoe has 73 percent of capacity, Lake Lahonton of the Truckee-Carson Drainage 80 percent, and Topaz and Bridgeport Reservoirs of the Walker Basin 90 and 93 percent respectively.

1. The first part of the paper

is devoted to a discussion

of the general principles of the theory

of the motion of a particle in a magnetic field

and the calculation of the cross-sections of the various processes

which take place in the interaction of a particle with a nucleus

Part I. Eastern Sierra

Basin	Snow Course	Altitude of Snow Course	1946 Date of Snow Survey	Depth of Snow Inches	Density % Water	Water Equivalent Inches	Normal April 1 Water Equivalent	% of April 1 Normal	Year 1945	
									% of April 1 Normal	Date
South Yuba and Crest	Furnace Flat	6600	1/30 3/5	92.7 109.3	38.9 45.2	36.1 49.4	(59) (59)	61.2 83.7	31.0 55.9	1/30 2/26
	Fordyce Lake	6500	1/29 3/4	89.1 97.5	41.3 39.7	36.8 38.7	(51) (51)	72.2 75.9	31.4 52.5	1/30 2/27
	Soda Springs	6750	12/30 2/1 3/1	71.7 71.1 84.6	46.3 44.9 43.1	33.2 31.9 36.5	(42) (42) (42)	79.0 76.0 86.9	46.0 56.7	2/4 2/28
	Donner Summit	6900	12/30 2/1 3/1	84.9 82.4 97.5	37.5 40.2 42.0	31.9 33.1 41.0	47.8 47.8 47.8	56.7 69.2 85.8	46.9 52.1	2/3 2/28
	Ward Creek	7000	3/2	88.2	40.6	35.8	52.7	67.9	60.2	3/4
	Independence Camp	7000	3/3	66.2	38.1	25.2	(26.5)	95.1	64.5	3/9
	Sage Hen Creek	6500	2/2 3/2	46.9 54.1	36.2 34.8	17.0 18.8	(22) (22)	77.3 85.5	56.4 64.5	2/11 3/11
	Truckee #2	6400	2/3 3/2	49.5 46.0	32.1 34.8	15.9 16.0	(20) (20)	79.5 80.0	63.5	3/4
	Donner Lake	5950	12/29 1/31 3/1	41.8 47.6 59.2	38.8 39.7 36.5	16.2 18.9 21.5	New Course " "			
	Truckee R.S.	6000	12/29 1/31 3/2	29.3 33.9 38.3	28.0 34.2 36.3	8.2 11.6 13.9	New Course " "			

Truckee

Part 1. Eastern Sierra (Continued)

Basin	Snow Course	Altitude of Snow Course	1946 Date of Snow Survey	Depth of Snow Inches	Density % Water	Water Equivalent Inches	Normal April 1 Water Equivalent	% of April 1 Normal	Year 1945 % of April 1 Normal	Date
Tahoe	Tahoe City	6250	1/3	32.1	32.4	10.4	15.9	65.4		
			1/31	28.2	35.5	10.0	15.9	62.9	29.6	2/4
			2/28	33.5	36.5	12.2	15.9	76.7	36.5	3/1
	Marlette Lake	8000	1/3	58.7	33.4	19.6	27.8	70.5		
			3/3	65.8	38.7	25.5	27.8	91.7	77.3	3/1
	Daggetts Pass	7350	2/2	33.7	31.2	10.5*	16.3	64.4		
				*Incomplete						
	Richardson #1	6500	3/9	36.8	35.6	13.1	16.3	80.4	67.5	3/3
			3/10	30.3	32.3	9.8	(13)	75.4	33.8	3/3
	Richardson #2	6500	2/3	51.1	26.8	13.7	No Normal			
Carson			3/10	45.6	33.3	15.2	"			
	Echo Summit	7500	12/31	85.4	34.8	29.7	(40)	74.3		
			2/1	87.8	40.2	35.3	(40)	88.2	46.0	1/31
			2/28	104.9	40.0	42.0	(40)	105.0	70.8	3/1
	Upper Truckee	6400	3/10	25.4	40.6	10.3	(11)	93.6		
	Glenbrook #2	6900	3/9	48.5	30.9	15.0	(20)	75.0		
	Blue Lakes	8000	1/31	74.6	37.2	27.8	48.1	57.8	57.4	2/4
			3/1	85.8	37.6	32.3	48.1	67.2	66.3	3/1
	Carson Pass	8600	1/21	59.1	40.4	23.9	(48)	50.0	38.5	1/25
			2/22	69.3	41.2	28.5	(48)	59.4	70.2	2/23
Mono	Tioga Pass	9900	3/2	58.0	39.7	23.0	(31)	74.2	88.4	2/26

Reservoir Storage March 1

Lake Tahoe, Lake Level	6227.38 ft.	Topaz Reservoir, Storage	55,918 acrefeet
Maximum Permitted	6229.1 ft.	Capacity approx.	60,000 acrefeet
Lake Lahonton, Storage	229,406 acrefeet	Bridgeport Reservoir	39,541 acrefeet
Capacity	286,000 acrefeet	Capacity approx.	42,500 acrefeet

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PART II. HUMBOLDT RIVER BASINS
EASTERN AND SOUTHERN NEVADA
NEVADA NATIONAL WILDLIFE
REFUGES

ST. LOUIS, MO. 1915
JAN. 10. 1915
ST. LOUIS, MO. 1915

Summary Forecast of Streamflow

March 1, 1946

1. Humboldt Basins

On the basis of revised snow-survey normals (which are 20 percent lower than previously) the snow cover of the North and South Feeders of the Upper Humboldt on March 1 was 102.7 percent of normal for each or approximately the same as last year.

The Little Humboldt-Quinn River area had a snow cover of 102.5 percent.

In the Reese River Basin the snow cover was only 65.2 percent of normal or 60 percent of last year's cover, but the winter precipitation at Austin (Nov-Feb.) was 92.6 percent of normal or only 10 percent lower than last year. The temperature was only slightly below normal, yet low snow seems to be lacking.

The flow of the streams of the Humboldt Basin during the March-July runoff may be subject to excess runoff of 40 percent of normal if the precipitation during this period should approximate 200 percent of its normal. The reverse also may be true.

A still more potent factor on the lower valley streams, which can be detected March 1 is the height of the water table indicated by the copiousness of the winter runoff and the height of the water in the wells.

All feeders above their canyon mouths are practically unaffected. These are the upper Marys, North Fork, Secret and Starr Creeks, Lamoille, South Fork, and Martin Creek.

These streams below their canyon mouths where the valleys are alluvial and meadows are abundant may suffer an increase of 60 percent of the March-July normal, but the main Humboldt above Palisade may suffer an extreme of 100 percent due to water that can not be absorbed by the soil.

Since the winter runoff of the main Humboldt was 174 percent of normal and the water table is even higher than last year, the probable effect of high water in the soil will offset any shrinkage due to lack of precipitation during runoff in all streams below canyon mouths but in the case of normal precipitation may increase the runoff 60 percent above the percentage of the snow cover to 160 percent. The Humboldt at Palisade may even flow 100 percent above it or a total of 200 percent.

The upper streams above the alluvial valleys will flow at 100 percent represented by the snow cover except that they will be subject to excess or deficiency of precipitation during runoff, which can reach to 40 percent of normal March-July runoff.

Paradise Valley because of its apparently high water table should have its valley streams flowing far in excess of the 102 percent of snow cover in its basin.

THE HISTORY OF THE

REIGN OF

CHARLES THE FIRST

By Sir Samuel Purchas, Knight, Secretary of the Admiralty, and
Author of the Description of the East and West Indies, &c.
The first part of this history, which contains the reign of
James the First, was published in the year 1619. The second
part, which contains the reign of Charles the First, was
published in the year 1642. The third part, which contains
the reign of Charles the Second, was published in the year
1685. The fourth part, which contains the reign of James
the Second, was published in the year 1704. The fifth part,
which contains the reign of George the First, was published
in the year 1714. The sixth part, which contains the
reign of George the Second, was published in the year 1727.
The seventh part, which contains the reign of George the
Third, was published in the year 1760. The eighth part,
which contains the reign of George the Fourth, was published
in the year 1801. The ninth part, which contains the
reign of George the Fifth, was published in the year 1910.
The tenth part, which contains the reign of Edward the
Seventh, was published in the year 1901. The eleventh part,
which contains the reign of George the Sixth, was published
in the year 1937. The twelfth part, which contains the
reign of Elizabeth the Second, was published in the year
1952. The thirteenth part, which contains the reign of
George the Sixth, was published in the year 1966. The
fourteenth part, which contains the reign of Elizabeth the
Second, was published in the year 1979. The fifteenth part,
which contains the reign of George the Sixth, was published
in the year 1982. The sixteenth part, which contains the
reign of Elizabeth the Second, was published in the year
1992. The seventeenth part, which contains the reign of
George the Sixth, was published in the year 2001. The
eighteenth part, which contains the reign of Elizabeth the
Second, was published in the year 2010. The nineteenth part,
which contains the reign of George the Sixth, was published
in the year 2015. The twentieth part, which contains the
reign of Elizabeth the Second, was published in the year
2020.

In the Reese River Basin the snow cover is only 65.2 percent of normal or 60 percent of last year's cover, but the winter (Nov-Feb.) precipitation at Austin was 92.6 percent of normal or only 10 percent lower than last year. The temperature was only slightly below normal, yet low snow seems to be lacking.

FORECAST TABLE
(Percent of Normal Mch-July)

Upper Humboldt		Probable Runoff with Normal Precipitation
Feeders above alluvial valleys		100
Feeders below alluvial valleys		160
Main Humboldt at Palisade		200 = 430,000 A.F.
Lower Humboldt		
1. Little Humboldt		
Upper Martin Creek		100 = 20,000 A.F.
Lower Martin Creek and Paradise Valley		160
2. Reese River		
Low snow lacking, but high snow 85 percent of last year or		90
3. Rye Patch Reservoir		
Storage 160,720 A.F.; capacity 178,100 A.F.		
Pitt-Taylor Reservoir 14,340 A.F.		

2. Eastern Nevada

The snow cover of Eastern Nevada is only 64 percent of normal or 60 percent of last year. This corresponds with the winter precipitation of 51 percent at Ely. The snow cover in Steptoe Valley is 67 percent of last season but in Baker Creek only 57 percent.

In the case of the 1955-56 season, the total catch was 1,000 tons, which was a record for the post-war period. This was due to a combination of factors, including a high level of effort and a favourable weather pattern.

(The above figures are preliminary and subject to revision.)

Estimated catch for 1956-57 season.

The following table shows the estimated catch for the 1956-57 season, based on current trends and weather forecasts.

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Estimated catch

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3. Southern Nevada

The snow drought seems to have become even worse in Southern Nevada. The snow cover on Mount Charleston is only 44.8 percent of normal or 52 percent of last year's snow storage. The winter precipitation of 41.9 percent at Las Vegas corresponds closely with it.

4. Wildlife Refuges

The snow cover at Sheldon and Ruby Lake Wildlife Refuges is almost an exact duplicate of the snow cover last year. The winter precipitation was 73.1 and 66.7 percent respectively.

4. Wildlife Refuges

The snow brought about to have been in the winter of 1901. The snow cover on some of the mountains is only 10 to 15 percent of normal or 50 percent of the snow storage. The winter precipitation of 1901 is 10 percent of the normal and corresponds closely with it.

4. Wildlife Refuges

The snow cover on the mountains and the snow cover on the mountains is almost a fact of the snow cover on the mountains. The winter precipitation was 10.1 and 10.1 respectively.

MARCH 1 SNOW SURVEY DATA
1. UPPER HUMBOLDT BASIN

Temperature departure Nov-Feb. Elko (5,077 ft.) -2.6°F
Mean temperature above freezing +7.2°F

Elevation feet:	Date	Snow depth: inches	Density: percent:	Water equivalent:	Normal water: equivalent	Percentage: of Mar. 1	Seasonal precipitation
					Mar. 1	normal	Percentage of normal at U.S.W.B. stations Nov-Feb.
<u>Northern Feeders</u>							
<u>Marys River</u>							
Bear Creek 7,800	Feb. 27	49.9	34.5	17.2	16.1	106.8)	Jarbridge-Mala Vista (6,100-5,585 ft.) 5.78 in.
Fox Creek 6,800	Feb. 28	31.3	30.0	9.4	8.6	103.5)	
Marys River 8,000	Mar. 8	53.7	31.5	16.9	17.9	94.4)	
<u>Marys River-North Fork</u>							
76 Creek 7,100	Mar. 8	42.5	31.3	13.3			
Big Bend 7,000	Mar. 7	34.8	29.0	10.1	9.0	112.2)	109.8:
Gold Creek 6,600	Mar. 7	28.2	25.9	7.3	6.8	107.4)	
<u>North Fork</u>							
Jack Creek 7,250	Mar. 1	30.8	31.5	9.7	10.2	95.1)	North Fork-
Jack Creek 6,800	Mar. 2	15.8	32.9	5.2	5.2	100.0)	Tuscarora-Owyhee
Rodeo Flat 6,800	Mar. 2	32.0	29.7	9.5	10.5	90.5)	94.3 : (6,500-5,400 ft.)
Fry Canyon 6,700	Mar. 1	31.4	28.0	8.8	9.6	91.7)	(Normal 5.25 in.)
Tremewan Ranch 5,700	Mar. 7	7.2	34.7	2.5	3.0	80.3	4.43+ in.; 84.4+
<u>Susie-Maggie Creeks</u>							
Taylor Canyon 6,200	Mar. 3	20.2	33.2	6.7	6.5	103.1)	Tuscarora (6,400 ft.) (Normal 6.02 in.) 4.79 in; 79.6
AVERAGE OF NORTHERN FEEDERS							
					Higher Levels 102.7		82.0+
					Lower Levels 80.3		

MARCH 1 SNOW SURVEY DATA
1. UPPER HUMBOLDT BASIN (Continued)

Elevation feet	Date	Snow depth: inches	Density: percent	Water equivalent:	Normal water: equivalent	Percentage: of Mar. 1	Seasonal Precipitation: of Mar. 1	Percentage of normal	Station	Percentage of normal	Station
Southern Feeders											
Trout-Starr-Secret Creeks											
Trout Creek	8,500										
Trout Creek	6,900										
Dorsey Basin	8,100	Mar. 5	39.4	28.2	11.1	11.0	20.2	100.9	100.4	Arthur-Wells	Inc.
Dry Creek	6,500	Mar. 5	18.8	31.4	5.9	5.9	6.2	100.0		(6,500-5,633 ft.)	
Ryan Ranch	5,800	Mar. 4	2.1	41.6	0.9	2.4				(Normal 5.71 in.)	
Lamoille-Rabbit Creeks											
Lamoille	8,700	Mar. 4	72.0	41.8	30.1	21.3		141.3		Lamoille-Elko	
Lamoille	8,700+	Mar. 4	62.1	39.8	24.7	22.5		112.0		(6,290-5,077 ft.)	
Lamoille	8,000	Mar. 5	56.3	30.9	17.4	17.1		101.8		(Normal 5.14 in.)	
Lamoille	7,700	Mar. 5	46.7	27.2	12.7	12.5		101.6		4.99 in.; 97.0	
Lamoille	7,300	Mar. 4	38.4	26.0	10.0	9.6		104.1			
Lamoille	7,100	Mar. 3	35.1	27.3	9.6	9.2		104.3			

+Cross Course

MARCH 1 SNOW SURVEY DATA

1. UPPER HUMBOLDT BASIN (Continued)

Elevation feet	Date	Snow depth: inches	Density: percent	Water: equivalent: Mar. 1	Normal water: equivalent: Mar. 1	Percentage of: Mar. 1 normal: Percentage of: normal at U.S.W.B. stations Nov-Feb.
Southern Feeders (Cont.)						
South Fork-Ruby Lake						
Corral Canyon	8,500	Mar. 1	53.0	18.3	14.1	129.8)
Green Mountain	8,000	Mar. 2	40.8	12.8	13.7	93.4)
Harrison Pass #2	7,400	Feb. 28	19.8	4.6)	5.9	74.6)
Harrison Pass #1	6,600	Feb. 28	18.5	4.4)		
Hager Canyon	8,500	Mar. 8	49.7	17.9	18.2	98.4)
Cave Creek	7,000	Mar. 8	40.4	15.7	15.8	99.4)
AVERAGE OF SOUTHERN FEEDERS				Higher Levels	102.7*	91.5*
				Lower Levels	37.5	

*The average for the Southern Feeders is computed by weighting the three groups of stations representing South Fork, Lamoille Creek, and Starr Creek on the basis of 2, 1 and 1/2 representing their relative contributions to the flow of the main Humboldt.

AVERAGE OF UPPER HUMBOLDT

Higher Levels 102.7
Lower Levels 58.9

86.8

**Normal based on Hylton

** Jiggs - Ruby Lake
(5,450-6,200 ft.)
(Normal Jiggs 5.04 in.)
Ruby Lake 3.17 in.
Jiggs 4.53 in.; 89.8

MARCH 1 SNOW SURVEY DATA

11. LOWER HUMBOLDT BASIN

Temperature departure Nov-Feb. Winnemucca -0.7°F

Mean max. temperature above freezing +12.2°F

Elevation feet	Date	Snow depth: inches	Density: percent	Water equivalent: inches	Normal water equivalent: inches	Percentage: of Mar. 1	Seasonal precipitation : U.S.W.B. stations Nov-Feb.
Rock Creek-Little Humboldt							
Midas	Mar. 8	16.8	43.1	7.12	6.6	109.1	
Little Humboldt Basin							
Lamance Creek	Mar. 5	30.9	33.3	10.3	10.7	96.3	Paradise-Orovada
Granite Peak	Mar. 3	40.2	31.0	13.0	9.5	136.8	(4,650-4,300 ft.
Martin Creek R.S.	Mar. 4	26.9	25.0	6.7	7.2	93.1	(Normal 4.10 in.)
Upper Buckskin	Mar. 4	19.8	34.1	6.8	10.2	95.9	3.75 in.; 91.4
Lower Buckskin	Mar. 4	25.8	28.0	7.1	8.2	86.6	
AVERAGE LITTLE HUMBOLDT BASIN						102.5	

Reese River Basin

Big Creek

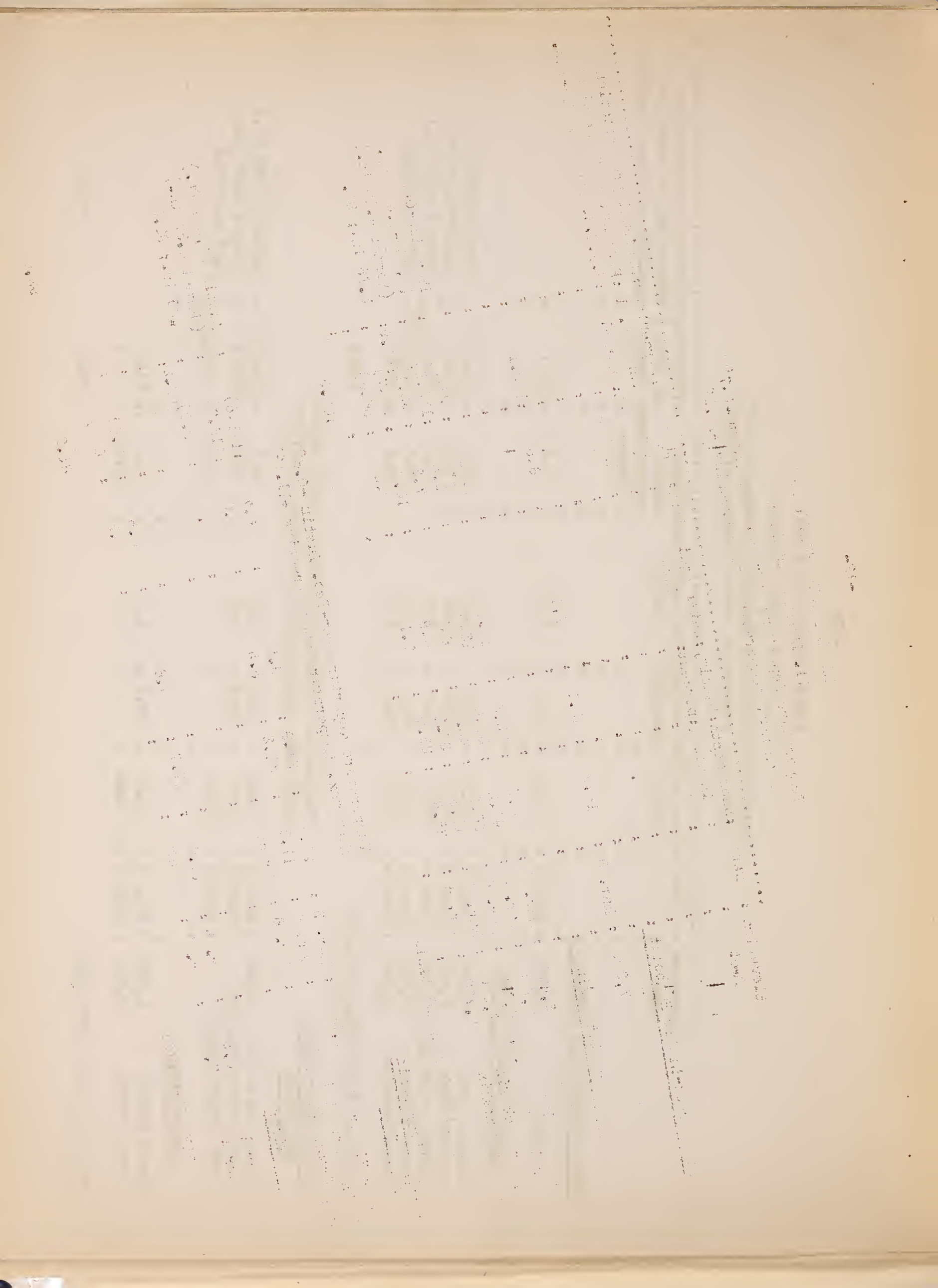
Temperature departure Nov-Feb. Austin -0.8°F
Mean max. temperature above freezing +11.1°F

Upper Big Creek	Mar. 3	29.8	31.9	9.5	6.7	141.8	Austin (6,594 ft.)
Cabin Course (Middle)	Mar. 6	11.2	31.2	3.5	3.0	116.7	(Normal 4.37 in.)
Camp Ground (Lower)	Mar. 6	Trace			3.0	0.0	4.05 in.; 92.6
Reese River						65.2	
Upper Corral	Mar. 5	16.6	27.7	4.6	6.8	67.6	
Lower Corral	Mar. 5	No Snow			3.3	0	

AVERAGE REESE RIVER BASIN

65.2

92.6



AVERAGE SOUTHERN NEVADA

Sheldon National Antelope Refuge (Northern Washoe County)

Temperature departure Nov-Feb. -1.6°F

Mean temperature above freezing +5.9°F

[illegible]

Ruby Lake National Wildlife Refuge (Southern Elko County)

Temperature departure Nov-Feb. Elko (5,077 ft.) -3.9°F

Ruby Lake (6,012 ft.)

Mean temperature above freezing -3.1°F

Elevation feet	Date	Snow depth: inches	Density: percent	Water equivalent: in. Mar. 1	Normal water equivalent Mar. 1 inches:	Percentage of normal of Mar. 1 : normal	Seasonal precipitation at U.S.W.B. stations Nov-Feb.
Hager Canyon	8,500	Mar. 8 :	49.7 :	17.9 :	18.2 :	98.4 }	(Arthur 6,500 ft.)
Cave Creek	7,000	Mar. 8 :	40.4 :	15.7 :	15.8 :	99.4 }	(Normal 7.92 in.)
		:	:	:	:	:	: 5.28 in.; 66.7
		:	:	:	:	:	(Ruby Lake 6,200 ft.)
		:	:	:	:	:	1.58 in. Inc.

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Comparison of March 1 Snow-Survey Data
1939 - 1946
Water Equivalent Only

Courses	Elevation:	1946	1945	1944	1943	1942	1941	1940	1939
	feet								
<u>1. Upper Humboldt Basin:</u>									
<u>Northern Feeders</u>									
<u>Marys River</u>									
Bear Creek	7,800	17.2	13.4	14.3	22.5	18.3	14.2	15.3	16.6
Fox Creek	6,800	9.4	6.9	9.5	9.6	9.8	7.6	5.7	8.7
Marys River	8,000	16.9		15.4	24.0	17.7	14.7		16.5
<u>Marys River-North Fork</u>									
76 Creek	7,100	13.3							
Big Bend	6,700	10.1	8.1	6.4	16.3	10.2	9.9	6.4	7.2
Gold Creek R.S.	6,600	7.3	6.3	4.0	10.9	8.1	6.2	4.7	4.5
<u>North Fork</u>									
Jack Creek	7,250	9.7	10.7	9.4	12.3	11.5	9.4	8.9	12.9
Jack Creek	6,800	5.2	6.6	4.9	3.3	6.7	4.2	1.3	7.9
Rodeo Flat	6,800	9.5	10.0	10.1	12.5	11.4	10.5	7.5	11.0
Fry Canyon	6,700	8.8	8.6	8.2	10.7	10.5	9.2	6.5	10.0
Tremewan Ranch	5,700	2.5	2.2	2.9	2.3	4.1	3.2	0	2.4
<u>Susie-Maggie Creek</u>									
Taylor Canyon	6,200	6.7	7.6	4.2	4.4	8.5	8.3	3.0	5.6
<u>Southern Feeders</u>									
<u>Trout-Starr-Secret Creeks</u>									
Trout Creek	8,500		21.1	11.9	24.1	17.5	24.9	19.7	19.6
Trout Creek	6,900		6.4	0	4.8	9.0	6.5	7.4	5.0
Dorsey Basin	8,100	11.1	10.1	12.4	10.1	14.0	9.6	11.3	8.1
Dry Creek	6,500	5.9	5.8	5.9	4.8	7.6	6.6	3.2	3.6
Ryan Ranch	5,800	0.9	3.1	4.0	0.8	4.3	0.4	0.5	1.6
<u>Lamoille-Rabbit Creeks</u>									
Lamoille Canyon	8,700	30.1	22.1	21.7	31.6	23.8	22.7	20.4	23.4
Lamoille Canyon	8,700+	24.7	19.1	22.5	29.1	23.7	21.3	19.4	22.7
Lamoille Canyon	8,000	17.4		16.1	21.0	18.5	15.3	14.7	
Lamoille Canyon	7,700	12.7	12.4	13.0	13.7	13.3	11.2	11.8	12.6
Lamoille Canyon	7,300	10.0	10.3	10.5	12.0	12.7	9.4	9.1	9.4
Lamoille Canyon	7,100	9.6	10.5	9.3	11.7	12.4	10.2	7.4	8.6
<u>South Fork-Ruby Lake</u>									
Corral Canyon	8,500	18.3	18.1	16.2	15.8	15.8	13.2	14.4	16.1
Green Mountain	8,000	12.8	12.3	12.6	12.2	14.1	13.7	13.1	15.3
Harrison Pass #2	7,400		6.9	6.6	2.6	7.7	6.0	4.9	5.3
Harrison Pass #1	6,600	(4.5)	5.9	5.0	2.3	6.5	5.4	4.6	5.1
Hagar Canyon	8,500	17.9	17.0		19.1	21.0	14.8	19.3	
Cave Creek	7,000	15.8	15.5		14.6	16.2	0	12.4	

[illegible]

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June 11, 1904

Comparison of March 1 Snow-Survey Data
1939 - 1946

Courses	Elevation: feet	1946	1945	1944	1943	1942	1941	1940	1939
<u>2. Lower Humboldt Basin</u>									
<u>Rock Creek-Little Humboldt</u>									
Midas	7,200	7.2	7.9	4.8	5.2	9.2	7.3	5.2	
<u>Little Humboldt Basin</u>									
Lamance Creek	6,000	10.3	9.6	7.0	13.6	10.4	11.9	9.9	8.7
Granite Peak	7,800	13.0	11.4	7.4	18.9	13.7	15.7	15.0	12.8
Martin Creek R. S.	6,700	6.7	6.6	3.8	9.5	8.3	7.8	6.8	5.8
Upper Buckskin	7,200	6.8	14.2		14.9	11.2	13.4	10.8	8.0
Lower Buckskin	6,700	7.1	8.8		9.3	7.6	8.4	5.8	6.7
<u>Reese River Basin</u>									
<u>Big Creek</u>									
Upper Big Creek	8,000	9.5	9.4	7.3	3.4	6.6			
Cabin Course (Middle)		3.5	4.6	1.4	1.0	4.9			
Camp Ground (Lower)		T	5.1	2.0	T	4.7			
<u>Reese River</u>									
Upper Corral	8,500	4.6	6.9	9.8	5.4	5.0			
Lower Corral	7,500	0	3.5	3.9	2.7	3.0			
<u>3. Eastern Nevada</u>									
<u>Steptoe Valley</u>									
Murray Summit	7,250	3.1	4.6	5.2	5.0	3.7			
<u>Baker Creek</u>									
Baker Creek #3	9,230	9.2			13.0				
Baker Creek #2	8,950	9.6	14.5	34.5	12.8	15.6			
Baker Creek #1	7,950	3.2	7.9	10.0	6.0	5.3			
<u>4. Southern Nevada</u>									
<u>Charleston Mountain</u>									
Kyle Canyon	8,200	6.3	9.9	12.9	15.7	8.8	18.9		
Rainbow Canyon	7,800	7.1	9.5	12.2	16.7	10.5	22.4		
Lee Canyon	9,000	6.3	13.3	8.9	17.4	9.9	20.6		
Lee Canyon	8,300	4.4	13.6	9.3	13.9	7.8	16.5		
Clark Canyon	9,000	4.9							
Trough Springs	8,500	2.9							
<u>5. U.S. Wildlife Refuge:</u>									
<u>Sheldon Antelope Refuge</u>									
Bald Mountain	6,720	3.1	3.3	3.4	7.7	6.2	5.9		
<u>Ruby Lake Wildlife Refuge</u>									
Hagar Canyon	8,500	17.9	17.0		19.1	21.0	14.8		
Cave Creek	7,000	15.7	15.5		14.6	16.2	0		

Winter Precipitation
(U. S. Weather Bureau)

1. Upper Humboldt Basin

<u>Northern Feeders</u>	Marys River		North Fork		Maggie-Susie Creeks
Stations	Jarbidge	Mala Vista :	North Fork	Owyhee	Tuscarora
Elevation (Ft. Alt.)	(6,100)	(5,585)	(6,500)	(5,400)	(6,400)
November	2.09	0.70	1.17	1.47	1.89
December	2.86	1.24	2.02	1.54	2.25
January	2.31	0.30	0.85	0.94	
February	<u>1.92</u>	<u>0.15</u>		<u>0.50</u>	<u>0.65</u>
Total	9.18	2.39	4.04 Inc.	4.45	4.79 Inc.
Weather Bureau Normal (Nov-Feb.)			4.64	5.10	6.02
Seasonal Percentage of Normal			87.1 Inc.	87.3	79.6 Inc.
Area Percentage				84.7 Inc.	
Northern Feeders			84.7 Inc.		

<u>Southern Feeders</u>	Trout-Starr-Secret Creeks		Lamoille-Rabbit Creeks		South Fork	
Stations	Wells	Arthur :	Lamoille	Elko	Jiggs* Ruby Lake	
Elevation (Ft. Alt.)	(5,663)	(6,500)	(6,290)	(5,077)	(7,081)	(6,200)
November	2.13	1.66	2.24	0.96	1.42	0.30
December	1.13	2.02	1.59	1.94	1.63	
January	0.92	0.85	1.46	0.64	0.88	0.69
February	<u>0.45</u>	<u>0.85</u>	<u>0.89</u>	<u>0.28</u>	<u>0.69</u>	<u>0.59</u>
Total	4.63	5.38	6.18	3.82	4.62	1.58
Weather Bureau Normal (Nov-Feb.)	4.00	7.38	6.25	4.43	5.04	
Seasonal Percentage of Normal	115.8	72.9	98.9	86.2	91.7	
Area Percentage	94.4		92.6		91.7	
Southern Feeders			92.3**			

*Continuation of Hylton
Normal based on Hylton
**See Footnote p. 11

THEORY OF THE EARTH

CHAPTER I

1.1

1.2

1.3

1.4

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THEORY OF THE EARTH

Winter Precipitation
(U. S. Weather Bureau)

2. Lower Humboldt Basin

Stations	Paradise Valley	Orovada	Austin	Battle Mt.	Winnemucca	Rye Patch Dam	Lovelock
Elevation (Ft. Alt.)	(4,650)	(4,300)	(6,594)	(4,513)	(4,287)	(4,161)	(3,977)
November	0.92	1.43	1.25	0.57	1.26	0.78	0.17
December	1.97	2.08	1.29	0.97	1.51	0.64	0.69
January	0.55		1.06	0.34	0.44	0.10	0.03
February	<u>0.29</u>	<u>0.26</u>	<u>0.47</u>	<u>0.20</u>	<u>0.36</u>	<u>0.18</u>	<u>0.16</u>
Total	3.73	3.77	4.07	2.08	3.57	1.70	1.05

Weather Bureau

Normal (Nov-
Feb.)

4.10	4.09	4.28	2.54	3.70	1.71
------	------	------	------	------	------

Seasonal Percentage
of Normal

91.0	92.2	95.1	81.9	96.5	61.4
------	------	------	------	------	------

Area Percentage

91.6	95.1	89.2	61.4
------	------	------	------

3. Eastern Nevada

4. Southern Nevada

5. Wildlife Refuges

Stations	Ely	Lehman Caves Nat'l. Mon.	Kyle Canyon R. S.	Ruby Lake	Sheldon
Elevation (Ft. Alt.)	(6,257)	(7,200)	(7,165)	(6,200)	(6,500)
November	0.87	0.73	0.13	0.30	1.96
December	0.23	0.29	3.88		0.68
January	0.62	0.30		0.69	0.38
February	<u>0.08</u>	<u>0.52</u>	<u>0.98*</u>	<u>0.59</u>	<u>0.47</u>
Total	1.80	1.84	4.99	1.58	3.49

*Partly estimated

Weather Bureau

Normal (Nov-
Feb.)

3.53	4.73
------	------

Seasonal Percentage
of Normal

51.0

(Las Vegas
A.P. 41.9)

(Arthur
72.9)

73.8

* Partly estimated
 *** Estimated from one measurement
 and temperature record

Winter Temperature Departure from Normal

Mean Max. Temperature during Winter above 32°F (Freezing)

	<u>1942-1943</u>	<u>1943-1944</u>	<u>1944-1945</u>	<u>1945-1946</u>
Nov.	+3.0	+9.2	+2.8	+12.9
Dec.	-0.2	+5.4	-8.5	+4.0
Jan.	-3.6	-1.2	+2.5	+2.8
Feb.	-2.2	+3.2	+9.5	+9.2
Avg.	-0.8	+4.2	+1.6	+7.2

-20-
Well Measurements
March 1

The March 1 level of the Humboldt Valley wells is approximately the same as of that date in 1945, but the Lamoille Valley wells are lower than any year since 1941.

Upper Humboldt Valley
(Average of 7 Wells 11.62 ft.)*

To Water Level:

	7 Wells	5 Wells
1941.....	12.90 ft.	15.80 ft.
1942.....	9.19 "	11.20 "
1943.....	9.97 "	12.22 "
1944.....	"	10.50 "
1945.....	11.09 "	12.61 "
1946.....	10.7 "	12.26 "

*For 1941 to 1944 approximately April 1

Lamoille Valley
(Average of 5 Wells 4.24 ft.)

To Water Level:

	5 Wells
1935.....	5.03 ft.
1936.....	3.72 "
1937.....	3.57 "
1938.....	4.50 "
1939.....	3.92 "
1940.....	4.50 "
1941.....	5.70 "
1942.....	3.80 "
1943.....	3.40 "
1944.....	4.14 "
1945.....	3.30 "
1946.....	4.20 "

Lamoille Valley Wells

Low Water Departure (ft.) from Normal (Avg. of 12 Yrs. '35-'46)

Well	Depth	L.W. Normal	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
Charles Church	26.4	23.3	-3.1	-3.1	-2.2	+1.0	+2.3	+1.3	-2.7	+2.8	+3.3	+0.6	+2.2	+2.2
Case	15.6	14.2	-1.4	-1.4	-1.4	-1.4	+2.2	-1.4	+1.2	+3.2	+2.7	+1.0	+1.5	+2.8
Patterson	27.5	20.3	-7.2	-7.2	-1.7	-1.7	+3.8	+3.6	-7.2	+4.3	+9.8	+3.9	+7.0	+7.5
McKinney Gate	13.4	7.1	-5.5	-1.1	-1.6	-1.7	+2.4	-0.5	-0.4	+2.3	+3.6	+2.4	+2.9	+3.7
Lytton Lane 1	4.5	2.9	0.0	-0.7	-0.6	+0.6	-0.4	-0.2	+0.9	-0.1	+0.4	+0.5	+1.5	+0.8
Lytton Lane 2	5.1	4.5	-0.9	-0.2	-0.5	+0.8	+0.2	-0.3	+0.5	+0.1	+0.2	-0.3	+1.2	+0.3
	6.9	5.5	-1.3	+1.0	-1.4	+0.4	-0.1	-0.1	+0.9	+0.3	+0.3	+0.4	+1.4	+0.9

The table will ultimately include all of the wells of both valleys

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FORECAST

The final forecast of streamflow for the season must depend upon the two snow surveys of March 1 and April 1 which are designed to give the basic snow cover at the beginning of March, when the shallow snow of the Great Basin mountains begins to melt, and the residual snow cover at the beginning of April, which should indicate the probable span of streamflow. In the present or earlier bulletin, therefore, only the general forecast based on the initial snow cover will be made.

1. Factors

The chief factors upon which the general accuracy of the forecasts must be based are the snow cover (or winter precipitation) and the precipitation during the earlier portion of the period of runoff when the snow cover is most widely extended. But on all streams flowing through meadows and alluvial valleys, where the water table fluctuates, or on streams affected by diversions there are also the factors of soil moisture and diversions that can be determined at the beginning of the runoff season.

(a) Diversions

Unfortunately most of the gaging stations in the Humboldt Basin are below diversions. The main station at Palisade by which forecasting has been judged is below 170,000 acres of irrigated land which absorb 70 percent of the original supply of the river, leaving normally only 215,000 acrefeet for the lower Humboldt. Since the water is not closely apportioned according to the snow supply and the amount of diversion does not greatly change, the water residue below diversions varies at a greater percentage rate than the snow cover. For example, a change of 10 percent in snow cover on the Humboldt, where diversions are high, may cause a change of 34 percent in normal runoff at Palisade.

The following table will illustrate:

<u>Diversion Effect on Main Humboldt</u>					
	Snow Cover		Diversion for Irrigation A.F.	Residual Water at Palisade	
	Percent	Orig. Water Supply A.F.		Acre-feet	Percent of Normal
Normal	100	725,000	510,000	215,000	100
	90	652,500	510,000	142,500	66.3
	110	797,500	510,000	287,500	133.7

Last year and this year the snow cover was identical and by the revised normals last year's snow like this was normal. The correction factor need not therefore be applied to the forecast of either.

(b) Water Table

As will be seen by the appended discussion of the excessive flow of the Humboldt in 1944-45, the factor of water-table should be applied to all estimates of flow below meadows and alluvial valleys. The departure of the water-table from normal can be determined qualitatively by the winter runoff and the height of water in the wells adjusted for temperature.

Quantitatively the factor varies with the size of the meadow or alluvial areas. In 1944-45 under possible exaggeration by the double-normal precipitation, the water-table factor was 60 percent of normal on the lower reaches of the feeders of the Humboldt but 100 percent on the main Humboldt itself at Palisade. On the mountain slopes of the feeders, where the soil mantle is shallow or steep, the factor of water table obviously is missing. Since winter runoff and height of the water are much the same as last year, the same factors are experimentally proposed for this.

(c) Precipitation during Runoff

On the basis of last year's double-normal precipitation, the factor for 100 percent excess in March-July precipitation is 40 percent of the March-July runoff. This factor naturally applies to the earlier portion of the period when the snowfields are widest in extent. In the Central Sierra the factor for April-May has been estimated by Dr. H. Landsberg at 20 percent.

2. Basic Data

The following basic data with adjustments in factors represent the trend and probable quantity of the runoff:

A. Precipitation and Snow Cover

I. Upper Humboldt Basin
(Percentage of Normal)

(a) Winter Precipitation and Snow Cover March 1

Northern Feeders	Precip. (Nov.-Feb.)	82.0+;	Snow Cover (Mch. 1)	102.7
Southern Feeders	" " "	91.5;	" " " "	102.7
Upper Humboldt	" " "	86.8;	" " " "	102.7

(b) Winter Temperature (Nov.-Feb.) was consistently below normal, with an average departure of -2.6°F.

(c) Winter Runoff at Palisade 173.8; Runoff double normal during Nov.-Jan. but 150 percent of normal in February.

(d) Well Measurements (feet above normal)

Humboldt Valley +0.92 ft.
Lamoille Valley +0.04 ft.

A total of 100,000 copies of the report were distributed in 1961-62, and a further 100,000 copies were distributed in 1962-63. The report was also distributed to the libraries of the various countries in the region.

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Estimated effect at Palisade 100 percent of normal, but 60 percent on the lower reaches of the feeders. Bared, however, on last year when double March-July precipitation occurred.

(e) Estimated March-July runoff at Palisade 102.7 percent expanded to 200 percent because of height of water table. Normal 215,000 A.F. (Mean Median 203,300 A.F.). Probable runoff (a) Mch.-July 430,000 A.F.; (b) Mch.-Sept. 441,400 A.F.

II. Lower Humboldt Basin (Percentage of Normal)

1. Little Humboldt

(a) Winter Precipitation and Snow Cover Mar. 1
Precipitation (Nov.-Feb.) 91.4; Snow Cover (March 1) 102.5

(b) Winter Runoff of Martin Creek 81.8

(c) Estimated Runoff Mch.-July 102.5 percent. Normal 20,320 A.F. (Mch.-July); 21,440 (Mch.-Sept.). Probable runoff Mch.-July 20,830 A.F.; Mch.-Sept. 22,270 A.F. But probable runoff in alluvial Paradise Valley 160 percent of Valley normal.

2. Reese River

Winter Precipitation (Austin) 92.6
Low snow lacking but high snow 90 percent of normal.

Rye Patch Reservoir contains 160,720 A.F. or 90 percent of its capacity of 178,100 A.F.

The Pitt-Taylor Reservoirs now have 14,340 A.F. stored in a usable capacity of 26,000 A.F. Reservoir No. 1 has 7,850 A.F. and No. 2, 6,490 A.F.

Excess or deficiency of March-July precipitation may increase or diminish these estimates by a possible maximum of 40 percent of normal.

III. Eastern Nevada

The Nov.-Feb. precipitation at Ely is only 51.0 percent of normal and the snow cover is 64 percent of normal or 60 percent of last year.

IV. Southern Nevada

The precipitation at Las Vegas Airport for Nov.-Feb. has been only 41.9 percent of normal, and the snow cover only 44.8 percent of normal or 52 percent of last year's snow storage.

V. Wildlife Refuges

1. Sheldon Antelope Refuge

The snow cover at Bald Mountain is practically identical in water equivalent with last year though the density is slightly greater. The mean depth is 10.7 in. The percentage of the snow cover is estimated at 64.6 and the winter precipitation at 73.1. Unfortunately lack of personnel and distance from headquarters has caused the discontinuance of the course on Mahogany Mountain.

(Continued from page 6)

STANDARD OF PROBABILITIES

1. What is the purpose of the following text?

6-10 1000 1000 1000 1000 1000 (3)

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Figure 1. The effect of the concentration of the *Agrobacterium* suspension on the transformation efficiency of *Agrobacterium* strains. The concentration of the *Agrobacterium* suspension was 10⁶ cells/ml (a), 10⁷ cells/ml (b), 10⁸ cells/ml (c), and 10⁹ cells/ml (d). The concentration of the *Agrobacterium* suspension was 10⁶ cells/ml (a), 10⁷ cells/ml (b), 10⁸ cells/ml (c), and 10⁹ cells/ml (d). The concentration of the *Agrobacterium* suspension was 10⁶ cells/ml (a), 10⁷ cells/ml (b), 10⁸ cells/ml (c), and 10⁹ cells/ml (d). The concentration of the *Agrobacterium* suspension was 10⁶ cells/ml (a), 10⁷ cells/ml (b), 10⁸ cells/ml (c), and 10⁹ cells/ml (d).

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...and the *Journal of the American Medical Association* (JAMA) ...

1940-1941

2. Ruby Lake Refuge

The water equivalent of the snow cover is again practically the same as last year but the density is 8 percent higher or 36.0 to 38.9 percent. The average snow depth at the courses is 40 to 50 inches. The estimated percentage of normal is 98.9 but the winter precipitation at Arthur is only 66.7 percent of normal.

3. Analysis of Runoff 1944-45.

The desire to determine the potency of the high water table in the runoff of March-July 1945 and its area of activity seemed at first to have been thwarted by the almost equally potent factor of heavy precipitation that prevailed throughout the period. Except for the exaggeration that may have been caused by the addition of the excess precipitation to the high water table, it seems possible to separate the two factors and determine the limitations of area of the former.

The weather-elements and runoff for the season of March-September are given in the following table. The precipitation during runoff is confined to Elko, Lamoille, and Wells and the temperature to Elko.

1. Weather and Runoff of the Main Upper Humboldt River March-September 1945

Period	Snow Cover By Revised Normals %	Precip. at Elko, Lamoille Wells		Temp. at Elko Departure OF	Runoff at Palisade		
		In.	%		Normal A.F.	Acro-feet	%
March 1	102.8						
March		2.64	163.2	-4.8	32,600	44,500	136
April		1.07	88.7	-5.7	47,200	92,180	195
May		2.95	233.9	-1.0	55,500	166,300	305
June		2.60	339.6	-6.6	60,400	155,400	257
July		1.87	118.4	+0.3	20,300	73,880	364
August		1.23	201.6	-0.6	3,600	10,020	278
September		0.59	126.6	-2.3	2,100	3,670	175
March-July	102.8		188.8		215,000	529,400	246
Previous Nov-Feb.					28,800	43,370	151

The first part of the report deals with the general situation of the country and the progress of the work. It is followed by a detailed account of the various expeditions and the results obtained. The report concludes with a summary of the work done and the conclusions reached.

The second part of the report deals with the detailed results of the various expeditions. It is divided into several sections, each dealing with a different aspect of the work. The first section deals with the general results of the work, and the following sections deal with the results of the various expeditions.

The third part of the report deals with the detailed results of the various expeditions. It is divided into several sections, each dealing with a different aspect of the work. The first section deals with the general results of the work, and the following sections deal with the results of the various expeditions.

The fourth part of the report deals with the detailed results of the various expeditions. It is divided into several sections, each dealing with a different aspect of the work. The first section deals with the general results of the work, and the following sections deal with the results of the various expeditions.

The fifth part of the report deals with the detailed results of the various expeditions. It is divided into several sections, each dealing with a different aspect of the work. The first section deals with the general results of the work, and the following sections deal with the results of the various expeditions.

Date		Place		Remarks	
1901	Jan 1	London	England	Arrived	1901
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1901	Jan 4	London	England	Departed	1901
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1901	Jan 13	London	England	Arrived	1901
1901	Jan 14	London	England	Departed	1901
1901	Jan 15	London	England	Arrived	1901
1901	Jan 16	London	England	Departed	1901
1901	Jan 17	London	England	Arrived	1901
1901	Jan 18	London	England	Departed	1901
1901	Jan 19	London	England	Arrived	1901
1901	Jan 20	London	England	Departed	1901
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1901	Jan 27	London	England	Arrived	1901
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1901	Jan 29	London	England	Arrived	1901
1901	Jan 30	London	England	Departed	1901
1901	Jan 31	London	England	Arrived	1901
1901	Feb 1	London	England	Departed	1901
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1901	Feb 7	London	England	Departed	1901
1901	Feb 8	London	England	Arrived	1901
1901	Feb 9	London	England	Departed	1901
1901	Feb 10	London	England	Arrived	1901
1901	Feb 11	London	England	Departed	1901
1901	Feb 12	London	England	Arrived	1901
1901	Feb 13	London	England	Departed	1901
1901	Feb 14	London	England	Arrived	1901
1901	Feb 15	London	England	Departed	1901
1901	Feb 16	London	England	Arrived	1901
1901	Feb 17	London	England	Departed	1901
1901	Feb 18	London	England	Arrived	1901
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1901	Feb 20	London	England	Arrived	1901
1901	Feb 21	London	England	Departed	1901
1901	Feb 22	London	England	Arrived	1901
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1901	Feb 24	London	England	Arrived	1901
1901	Feb 25	London	England	Departed	1901
1901	Feb 26	London	England	Arrived	1901
1901	Feb 27	London	England	Departed	1901
1901	Feb 28	London	England	Arrived	1901
1901	Feb 29	London	England	Departed	1901
1901	Mar 1	London	England	Arrived	1901

(2). Weather and Runoff of Martin Creek

above Paradise Valley

March-September 1945

Period	Snow Cover By Revised Normals %	Precip. at Paradise Valley and Orovada In. %		Temp. at Winnemucca Departure of	Runoff near Paradise Valley Normal Acre- % feet		
March 1	109.9						
March		1.41	158.4	-2.2	3,610	2,880	79.8
April		0.34	42.9	-2.6	6,330	5,720	91.3
May		1.92	202.6	+1.5	6,530	10,000	153.1
June		1.62	230.5	-2.4	2,950	6,330	214.6
July		0.50	181.8	+4.6	900	1,110	123.3
August		0.06	25.5	+1.5	620	438	70.6
September		0.30	62.1	0	500	376	75.2
March-July	109.9		163.2		20,320	26,040	128.1
March-September					21,440	26,854	125.3
Previous Nov-Feb.					3,700	3,027	81.8

(3). Variation in Runoff with Type of Soil Mantle

Streams	Snow Cover (Mch. 1) % of Normal	Precip. (Mch-July) % of Normal	Runoff (Mch-July)	Excess % of Normal
(a) On steeper slopes above meadows and alluvial soil.				
Lamoille Creek (Power House)	107.1	188.8	142.8	40.7
South Fork (Lee)	114.4	"	159.2	44.8
Martin Creek (Above Paradise Valley)	109.4	163.2	128.1	18.7
(b) On medium slopes or bench land, with moderate meadows and alluvial soil.				
Marys River (Hot Springs)	89.3	188.8	188.0	98.7
North Fork (Devils Gate)	89.3	"	177.3	88.0
South Fork (Near Elko)	114.4	"	220.9	106.5
(c) In Valley bottom				
Main Upper Humboldt (Palisade)	102.8	188.8	247.0	144.2

The increase in runoff rises sharply with the alluvial type of soil mantle. Since the water-table influence must be almost entirely lacking on the steeper slopes, the excess of approximately 40 percent of normal found there may be considered the precipitation factor applicable to the nearly double precipitation that occurred. The factor of 18.7 percent on Martin Creek should have been 34 percent for its excess precipitation of 163.2 percent. But the normals for most of these stations except the South Fork near Elko and the Humboldt at Palisade and Martin Creek are based on relatively short records. If Martin Creek is selected as standard, the precipitation factor on the Upper Humboldt would be lowered from 40 to 25 percent.

On the basis of a precipitation factor of 40 percent, the residual excess due evidently to the high water table or super-saturation of the soil becomes roughly 60 percent on medium slopes and 100 percent in the broad valley. This large excess may be due in part to the excessive precipitation that satisfies somewhat the irrigation needs and reduces the water demands. From and including 1942 when double normal precipitation with the build-up of high water table occurred, the excess runoff at Palisade has been 120, 105, 46, and 145 percent. The first and the last represent also double precipitation.

4. Statistical Data

The following table (1) is an initial attempt to build up a complete picture of the water sources and runoff cycle in the Humboldt Basin. More stations and normals are desired.

Table (2) by H. C. Hoffman provides another essential summary of the snow courses in Nevada. A summary of the artesian flow at the base of Mount Charleston or Spring Range is necessary for comparison.

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Continued Data

The following table (1) is an attempt to bring up to date the
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(2) by H. E. ...
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(1) Streamflow in the Humboldt Basin
1944-1945
(A.F.)

Streams and Gaging Stations	Winter Flow (Nov-Feb)			March-July			Summer Flow			March-September Seasonal Percent
	Normal	Seasonal	Percent	Normal	Seasonal	Percent	Percent	Normal	Seasonal	
Marys River below Hot Spgs near Deeth North Fork at Devils Gate		2,718		29,500*	58,960		183.0*		59,326	
		7,540			62,240				63,725	
		1,228		30,700*	54,440*	177.3*				
Lamoille Creek and McDermott Ditch at Power House near Lamoille				26,040	37,189	142.8			39,519	
<u>Humboldt near Elko</u>	23,840				290,550				295,355	
South Fork near Lee			44,000		70,040	159.2			73,070	
South Fork near Elko	10,010		81,910		180,980	220.9			186,080	
<u>Humboldt near Carlin</u>	34,800				463,540				474,160	
<u>Humboldt River at Paliade</u>	28,800	43,370	150.6	215,000 (Median 203,300)	529,400	246.2		220,700 (Median 207,200)	542,860	246.0
<u>Martin Creek near Paradise Valley</u>		6,353		20,320	26,040	128.1			26,854	
<u>Little Humboldt at Chimney Dam Site</u>		4,030			20,919				21,051	
<u>Little Humboldt near Paradise Valley</u>		4,974			19,087				20,005	
Cottonwood Creek		1,640			9,614				9,578	

*Apr.-July

(Tabulation of March 1 snow course averages for years 1941 through 1946, six-year mean of snow depth and water content for each course, and comparison of 1946 course averages with six year mean. Snow depth and water content are expressed in inches.)

H. C. Hoffman

Name of Snow Course	Period 1941 to 1946 inclusive												% of Six-year Mean that 1946 snow course averages are
	1941	1942	1943	1944	1945	1946							
Samp.:	Snow:	Water:	Snow:	Water:	Snow:	Water:	Snow:	Water:	Snow:	Water:	Snow:	Water:	
Taken:	Dep.:	Cont.:	Dep.:	Cont.:	De	Cont.:	Dep.:	Cont.:	Dep.:	Cont.:	Dep.:	Cont.:	
Rainbow Canyon:	:	:	:	:	:	:	:	:	:	:	:	:	:
7800 ft. elev.:	13	70.9:22.4	33.2	10.5:50.7	16.7	50.7:12.2	31.8	9.5	21.4	7.1	43.1	13.1	49.6: 54.2
Kyle Canyon	:	:	:	:	:	:	:	:	:	:	:	:	:
8200 ft. elev.:	17	60.0:18.9	28.2	8.8:47.6	15.7	53.4:12.9	33.9	9.9	19.8	6.3	40.5	12.1	48.9: 52.0
Lee Can. No. 1:	:	:	:	:	:	:	:	:	:	:	:	:	:
8300 ft. elev.:	13	56.1:16.5	26.1	7.8:43.5	13.9	37.9	9.3	51.5:13.6	13.3	4.4	38.1	10.9	34.9: 40.3
Lee Can. No. 2:	:	:	:	:	:	:	:	:	:	:	:	:	:
9000 ft. elev.:	13	68.7:20.6	32.5	9.8:54.3	17.4	39.5	8.9	48.6:13.3	21.0	6.3	44.1	12.7	47.6: 49.6
Trough Springs:	:	:	:	:	:	:	:	:	:	:	:	:	:
8500 ft. elev.:	9	:	:	:	:	:	:	:	9.5	2.9	:	:	:
Clark Canyon	:	:	:	:	:	:	:	:	:	:	:	:	:
9000 ft. elev.:	13	:	:	:	:	:	:	:	16.4	4.9	:	:	:
Totals	78	:	:	:	:	:	:	:	101.4	31.9	165.8	48.8	:
Means	:	63.9:19.6	30.0	9.2	49.0:15.9	45.4:10.8	41.4:11.5	16.9	5.3	41.4	12.2	40.8	43.5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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SNOW SURVEYORS
MARCH 1, 1946

Truckee Basin

A. Chase
J. Church
P. Cowgill

B. Eddy
V. Hart

Tahoe Basin

F. Barkley
R. Butler
D. Gaiennie
F. Giovannoni
M. Herz
W. Herz

H. Leonard
H. Oakley
I. Simmonds
W. Simmonds
E. Wise
H. Wolfe

Carson Basin

D. Dean
F. Dean

N. Green

Upper Humboldt

B. Allred
P. Arcimis
D. Bottari
T. Brierley
H. Corta
P. Corta, Jr.
H. Dill
H. Hansen

C. Houston
R. Kuehner
W. Lear
P. Moore
E. Murphy, Jr.
J. Murphy
A. Rohwer
R. Work

Lower Humboldt

V. Arzuaga
B. Crane
C. Gnevo
E. Green
Q. Hansen

C. Houston
F. Kennedy
E. Wilkerson
L. Wilkerson
R. Work

Eastern Nevada

F. Olsen
G. Southwick

R. Thomson

Northern Great Basin

M. Jacobs

Central Great Basin

F. Daniels
H. Hoffman

Mrs. H. Hoffman
G. Maxey

NEVADA COOPERATIVE SNOW SURVEYS

State

Nevada State Engineer
Nevada Agricultural Experiment Station
California Division of Water Resources
Colorado River Commission of Nevada

Federal

Soil Conservation Service
Forest Service
Weather Bureau
Bureau of Reclamation
Geological Survey
Fish and Wildlife Service

Public Utilities

Sierra Pacific Power Company
Elko-Lamoille Power Company
Wells Power Company

Organized Public Agencies

Truckee-Carson Irrigation District
Washoe County Water Conservation District
Walker River Irrigation District
Humboldt River Water Users

